

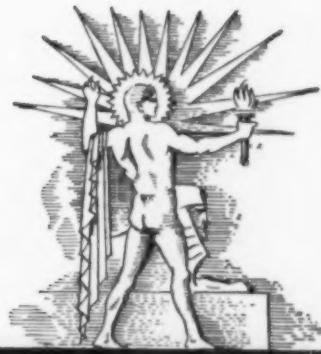
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SCIENCE NEWSLETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE.



SEPTEMBER 16, 1933

A Son of the Wild Jackass

See Page 185

A

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VOL. XXIV

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Summary of Science



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DO YOU KNOW?

The zinnia is native of Mexico.

No vitamins have been found in sugar.

California is the only state in which the sun-drying of fruits is practiced extensively.

Some of the big African snails, considered very good to eat, are said to be as long as eight inches.

The species of termites that are causing extensive damage to wooden structures in the United States are natives, not strange foreign pests.

Robins at Mammoth Hot Springs in Yellowstone National Park flock to the hot springs terraces to gather insects killed in the hot waters.

The United States has only 41 inhabitants to the square mile, as contrasted with Germany's 345, Great Britain's 446, and Belgium's 686.

An all-rubber lamp cord that does not kink and that can be obtained in various colors has been developed.

One undeveloped radio market, it is pointed out, is to sell good short wave sets to foreign-born persons who would be interested in programs from their native lands.

Lilacs and other woody branches look best in a vase if arranged in the approximate position they would have on the bush or tree.

Kentucky has set the pace for the states in livestock improvement by reporting three whole counties entirely free from grade and scrub bulls.

New signalling spotlights carried by aviators enable them to "stare" with steady light when looking for objects, or to "blink" when they want to talk with some one.

WITH THE SCIENCES THIS WEEK

ARCHAEOLOGY

Who first described the Maya ruins? p. 179. How widely distributed are Folsom dart points? p. 190. *Ancient Americans*—Emily C. Davis—Holt, 1931, \$3.50.

BIOCHEMISTRY

What can you learn from fingernails about arthritis? p. 185.

BOTANY

What are "apples of indignation"? p. 184.

CHEMISTRY

How durable are guayule tires? p. 187. Of what advantage is extreme cold in spectrographic studies? p. 181.

DEMOGRAPHY—PLANT PATHOLOGY

What one good thing did chestnut blight do? p. 191. *The Lure of the Great Smokies*—Robert L. Mason—Houghton Mifflin, 1927, \$4.50.

ECOLOGY—ANTHROPOLOGY

Has the Corn Belt always been in the same place? p. 189.

GEOGRAPHY

Is Antarctica really a continent? p. 182. *The Last Continent of Adventure*—Walter B. Haywood—Dodd, 1930, \$3.

GEOPHYSICS

Does the wind have any effect on geysers? p. 189.

MEDICINE

Why do medical researchers try to get crystals of gland secretions? p. 188.

PHYSICS

What is the new record for cosmic ray penetration? p. 179.

What is a "googly"? p. 180.

PHYSIOLOGY

What chemical combination seems to be a general growth stimulator? p. 184.

PLANT PATHOLOGY

How does the Dutch elm disease spread? p. 179. *Insects and Diseases of Ornamental Trees and Shrubs*—E. P. Felt and W. H. Rankin—Macmillan, 1932, \$5.

PLANT PHYSIOLOGY

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SOCIOLOGY

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TECHNOLOGY

How is the "machinability" of a metal measured? p. 184.

ZOOLOGY

Where do the sons of the wild jackass roam? p. 185.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information of the article, but are references for further reading. Books cited can be supplied by Book Dept., Science News Letter, at publishers' prices, prepaid in the United States.

PLANT PATHOLOGY

Elm Disease Entered America Under Bark of Veneer Logs

Beetles That Carry Destructive Fungus Detected In Shipments Arriving at Several Atlantic Ports

DUTCH ELM disease, which federal and state scientists are fighting desperately in the area around New York harbor, came in as a stowaway in elm logs shipped from Europe for use in the production of veneered furniture. Conclusive evidence to this effect was presented before a Shade Tree Conference recently at the New York Botanical Garden by R. Kent Beattie of the U. S. Department of Agriculture. Mr. Beattie is in charge of the U. S. Government's share of the battle against the new invasion, which threatens complete destruction to the millions of beautiful elms that line the streets of practically all the cities of this country.

Dutch elm disease is caused by a fungus that saps the life of the tree. It is carried from one tree to another by a small beetle.

The logs in which the beetles have been detected, in at least three American ports of entry, are special "burl" logs, grown so as to provide a highly ornamental grain, similar to curly maple. Although most of them apparently come from France, the logs are for some reason known to the furniture trade as "Carpathian elm." The import trade in these logs is not large, relatively speaking, and apparently only about a dozen veneer plants in the country handle them.

The first discovery of the disease-carrying beetles in elm logs was made by L. M. Scott, Port Inspector of the Bureau of Plant Quarantine, in Baltimore. The beetles were identified by Dr. M. W. Blackman of the Bureau of Entomology, and representatives of the Division of Forest Pathology examined the logs and found the tell-tale symptoms of the disease. Subsequently other shipments of logs, landed at New York and Norfolk, Va., have been found to harbor both the fungus that causes the disease and the beetles that carry it.

Diseased elms in the New York harbor area were first detected by a park foreman in Maplewood, N. J. An infection had been found in a few trees

in Cleveland and Cincinnati, three years ago; but this outbreak was vigorously fought and is believed to have been nearly stamped out.

Importers of the logs cooperated willingly with Department of Agriculture scientists, once the danger to American elms was pointed out, Mr. Beattie stated. An attempt to free them from the infected beetles by a hot-water treatment was made, but this was not very successful. Even if successful, this treatment would not prevent the beetles from emerging from the logs before it could be used, and flying to the nearest elm trees in the port of entry, thereby establishing new centers of infection.

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PHYSICS

Cosmic Rays Observed In Depths of Salt Mines

COSMIC rays from celestial space that are four times as penetrating as those known before have been shown to exist. They can plow through half a mile of water without being completely absorbed.

Prof. W. Kolhörster, working in the cosmic ray laboratory of the Magnetic Meteorological Observatory in Potsdam, Germany, and at great depths below the earth in the salt mines at Strassfurt, has obtained evidence for these ultra-penetrating rays. Bombs filled with gas at high pressures served as the cosmic ray meters.

Half a mile of water or its equivalent thickness of earth was necessary to cut out these high frequency rays, Prof. Kolhörster reports in a communication to *Nature*.

Besides their great penetrating abilities these new rays have the property of maintaining the enormous negative electric charge of the earth which has been puzzling scientists for many years. The earth is charged with negative electricity to a voltage so high that it fairly bristles with the charge. The Depart-

ment of Terrestrial Magnetism states that in order to maintain this charge a positive electric current of 1500 amperes must be flowing continuously away from the earth. Something must maintain this negative charge and Prof. Kolhörster believes that the new hard cosmic rays can do this.

American physicists, principally at the California Institute of Technology and at the Bartol Research Foundation, have found that the most penetrating cosmic rays yet observed in this country could not serve to keep the earth negatively charged but would tend to discharge it. Experiments at Mexico City have shown definitely that the previously known cosmic rays were made up of both positively and negatively charged particles but there were more positive than negative particles. These would dissipate the earth's negative charge.

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ARCHAEOLOGY

1630 Text Describes "Immemorial" Maya Ruins

WHAT APPEARS to be the first description of the now world-famous Maya ruins in Yucatan has been found in the Vatican library.

It is part of a book on the inhabitants of the New World, written in Spanish by Vasques de Espinosa, who died in Seville, Spain, in 1630, presumably while his book was still in the making. With his death the publication stopped, and the book, with 80 pages in print and 500 still in manuscript, lay unnoticed in the Vatican library until Dr. Charles U. Clark, searching for material bearing on early American history for the Smithsonian Institution, came upon it.

The passage referring to the Maya ruins has been translated, as follows:

"Five leagues from this city, near the village of Coban, there are some proud buildings of time immemorial, the memory of which has been lost for ages. Among the ruins of them there are extraordinary and admirable things, among which is a beautiful room in the midst of which is a very large table, well worked in stone like alabaster, and about it are seated many effigies, well finished, with good faces and long beards, armed with their breast plates and espaliers and morions, and swords in belts, and with them another figure clothed in a pontifical with a mitre on

his head—of work and dress very extraordinary, and altogether different from that of these realms. And connected with this room there are also corridors very well worked of stone with very large pillars which are so strong that they are still standing; and for over four and even six leagues around the proud edifices there is a great amount of worked stone; from which it appears that there were in these parts a people of great intelligence, industry, and courage, and great cities, which long ages swallowed up or turned into what our Spaniards found when they made the discovery."

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PUBLIC HEALTH

Black Rat Horde Menaces England With Black Death

BLACK rats can at any moment loose the Black Death upon England. All that is needed is for one plague-infected rat to elude the anti-rat precautions in the Port of London and make its landing from some ship from an oriental city where the bubonic plague is still common.

This warning was issued by M. A. C. Hinton, deputy keeper in zoology of the British Museum and one of the world's leading authorities on rats.

Black rats, Mr. Hinton declared, now swarm in London. They have largely supplanted the brown or Norway rats, which were formerly the dominant species in the rodent population. This change was attributed by Mr. Hinton to the development of modern buildings, which with their open skylights and their network of cables are ideal homes for the black rat, which was formerly a tree-dwelling species. The brown rat, a denizen of the sewers, is pretty effectually excluded from the buildings of present-day London. Man has thereby unwittingly aided a deadly enemy, for the fleas harbored by the black rat carry bubonic plague from rat to rat, and finally from rat to man.

Mr. Hinton strongly advocated a government campaign to eradicate rats and to make buildings really rat-proof. Such a drive, he said, would be like taking out an insurance policy on the whole nation.

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Sand flies, which bite so viciously, are best controlled by destroying their breeding places, says the Department of Agriculture.

PHYSICS

New Physics Troubled by Confusion in Nomenclature

Electron, With Its Negative Charge, Seems Misnomer Since Discovery of Its Opposite Twin, the Positron

PHYSICISTS are engaged in a family row over what the babies should be named. The botanists no longer stand alone as a scientific tribe that fights over names and classification. But the physicists can blame no one but themselves for having brought confusion into their speech. It all arose from their tremendous activity within the last two years of prying out several new particles from the chemical entity of matter, the atom.

Now that they have isolated these particles and have proved their existence they are in a quandary over what to christen them. The one that is stirring up the biggest argument is the new unit of positive electricity, found by Dr. Carl D. Anderson at the California Institute of Technology just a year ago. It appears to have the same electrical charge and mass as the electron, the unit of negative electricity, which has been known for many years.

Dr. Anderson has suggested that the new positive particle be called the "positron" and the old electron be rechristened to "negatron." This was to avoid confusion with the name "electron" that was originally devoid of significance regarding polarity.

Immediately many scientists objected to the rechristening and also to the disregard of mythology inherent in the word "positron." Prof. Herbert Dingle of Imperial College of Science and Technology in South Kensington, England, suggested the name "orestron" for the new positive particle. This is mythologically correct for Orestes was the brother of Electra.

The English physicists had in the meantime contributed to the confusion, but not in such a serious manner. The discovery of the positive particle had been made from an examination of curved tracks made by cosmic rays in plowing through a box filled with water vapor and placed between the poles of a magnet. Some of the tracks were bent in the wrong way. This could be explained only by having a new positive particle. But the sporting Englishmen immediately thought of cricket and the peculiar hops that the ball takes on bouncing in front of the wicket. These are called "googlies," so the new tracks and thus the particles became "googlies" also, in English laboratory slang.

A similar argument has arisen about the names to be given to the two varieties of hydrogen. The strict way of



LEADEN-FOOTED CHASE

Cornelia Clarke Photo.

Only a turtle pursuing a beetle; but isn't there something in this scene that is reminiscent of those nightmare dreams wherein you find yourself pursued by a monster, and discover that your feet are made of lead and can barely be moved; or (shifting to the turtle's viewpoint) where you are striving after a keenly desired and nearly attained goal, only to find yourself struggling against the same unconquerable lethargy?

classifying them as hydrogen isotope of mass one and hydrogen isotope of mass two are much too lengthy for common usage. Prof. Harold C. Urey of Columbia University, on behalf of the discoverers of heavy weight hydrogen proposed the names "protium" and "deuterium," but Prof. Gilbert N. Lewis and Ernest O. Lawrence of the University of California call the heart or nucleus of the heavy hydrogen atom "deuton," as contrasted to the common name for the heart of the light hydrogen, "proton."

Prof. William D. Harkins of the University of Chicago has taken the "neutron," that electrically uncharged particle of mass equal to the proton, discovered last year by Dr. James Chadwick in Cambridge, England, and has considered that all the "neutrons" in the universe make up a new chemical element of atomic number zero. For this element he proposed the name "neutron."

The person who should be considered in all this naming is the poor scientific student of the future who will have to remember all these strange names. Since so few pure scientists are tremendously interested in the mythology behind the names the suggestion that they should be called by descriptive names that will bring their properties to mind is certainly worth considering.

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SEISMOLOGY

Fiji Island Region Gets Heavy Quake

A HEAVY earthquake shook the Pacific Ocean floor near the Fiji Islands on Wednesday, Sept. 6, scientists of the U. S. Coast and Geodetic Survey reported after examining data collected telegraphically by Science Service. The quake began at 5:08 p. m., eastern standard time. Its epicenter, or point of greatest movement, was in approximately 18 degrees north latitude, 180 degrees west longitude.

Seismograph stations reporting to Science Service were those of the Dominion Observatory, Ottawa; the University of California, Berkeley, Calif.; the Seismological Laboratory, Pasadena, Calif.; Fordham University, New York City; and the stations of the U. S. Coast and Geodetic Survey at Tucson, Ariz., and Ukiah, Calif.

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CHEMISTRY

Solids Near Absolute Zero Yield Secrets Through Spectra

At Extremely Low Temperatures, Vibrations of Particles No Longer Cause Serious Distortions

THE Langmuir Medal, awarded annually for outstanding research in chemistry, is to be presented to Dr. Frank H. Spedding of the University of California. Dr. Spedding delivered the Langmuir Award Address on "Energy Levels in Solids" before the Chicago meeting of the American Chemical Society.

White light shining through thin films of solid matter and being absorbed in characteristic ways by the atoms in the solid has proved to be a powerful tool in understanding and evaluating the physical properties of matter. Dr. Spedding told how these color pictures could be obtained and how they could be interpreted to give an enormous fund of information about solids.

White light is composed of all wave lengths or frequencies. When it is shone through a substance some of these frequencies are absorbed in the substance because the constituent atoms are free to vibrate with just these frequencies. The light coming through the substance when spread out into a color picture or spectrum is lacking in some colors or has dark sections spread through it.

By observing these dark sections chemists are able to tell just what frequencies the atoms in the substance are capable of absorbing. From this information they can calculate such physical and chemical properties as how much heat is necessary to raise its temperature, the attraction in a magnetic field, how strongly the atoms are bound together, and so forth.

These "absorption spectra" of solids at ordinary temperatures usually have very broad dark sections because the absorbing atoms are disturbed by the electric and magnetic effects of their neighbors. At high temperatures, Dr. Spedding said, the atoms are vibrating and the distortions are of all degrees. Since the light observed is from billions of atoms, light of many frequencies is ab-

sorbed and broad bands occur in the spectra.

However, if the solid is cooled to the enormous frigidity of nearly absolute zero, minus 451 degrees Fahrenheit, the atoms in the frozen solid no longer vibrate and so the deformation of all the atoms is the same. Then only certain frequencies of the incident light will be absorbed and sharp dark lines will appear in the absorption spectra. From the position of these sharp lines chemists can calculate physical and chemical properties of the solid.

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ORNITHOLOGY

Bird Lover Sacrifices Savings for Sanctuary

STAKING his whole life savings for the preservation of a bird sanctuary is the heroic sacrifice made by a retired teacher, R. B. Burrowes, formerly of the Liverpool Technical College. Finding that the Dungeness Promontory, the only remaining natural and undisturbed area of any size on the southeast coast of Great Britain, was about to be exploited by building contractors, Mr. Burrowes sold and mortgaged everything he possessed to raise the sum of £5,585 (approximately \$25,150 at present exchange rates) necessary to obtain an option on the area.

A committee is now endeavoring to raise funds to give back at least £1,740, which will recover for Mr. Burrowes certain securities deposited at a bank as collateral for a loan. He will still be out of pocket to the extent of £3,845 pounds, but is content to accept this loss for the satisfaction of knowing that he has kept the birds' homes safe. In the meantime he is living on the slender annual pension of £138—about \$600.

The committee, which announces its quest in *Science*, states that contributions may be sent to the Manager, Lloyds Bank, Canterbury, England.

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GEOGRAPHY

New Attacks on the Last Continent

Discovery of the Earth Nears Its End as Explorers Plan to Pierce Again the Fractionally Known Antarctic

By EMILY C. DAVIS

WHEN ELLSWORTH and Balchen take to the air one carefully picked day next December and head their monoplane on a daring flight straight across the Antarctic continent, they will be off on one of the last thrilling adventures left in this almost-conquered world.

No human being has ever crossed the South Polar land, either on foot or in the air. To try is a big adventure. To succeed would be a triumph of exploration.

When you "read all about it" in the newspaper you can get a thrill of your own by stopping to realize that the last continent on earth is being discovered and explored in your lifetime. Not to appreciate what that means is to miss something—like living in the sixteenth century in Europe and being casual about the explorations of De Soto or Balboa. This twentieth century is finishing the world exploration job. People born in the twenty-first century will never know the excitement of discovery in the grand manner, after the fashion of Columbus, Magellan, and La Salle; Peary, Amundsen, and Byrd.

An Unfinished Map

But right now the Antarctic is as mysterious and interesting as America was when explorers were trying to find out how far the New World extended and what its shape might be.

In American exploration days, mapmakers drew queer outlines to represent the New World. New England they could draw with confidence, and a good deal of the seaboard to the south. But they shaped Florida like a knotty pear, and they left out the Great Lakes, and a vague gesture of the pen outlined the vast Northwest.

Antarctic maps are in that state today. Opposite Australia, where Byrd and other explorers have done intensive research, lies the "New England" of the frozen continent. That part of the South Polar map is drawn in considerable detail. Beyond that stretches

an ice-covered wilderness mainly uncharted. It spreads round the South Pole in a roughly circular mass as big as the United States and Mexico.

The area, if you think best in figures, is five million square miles, and only about a small fraction of it has ever been seen by man. It is a desert land with snow instead of sand, and the rocky tips of mountains for dark oases in the icy waste. But it is not a monotonous land. The ice and snow take varied scenic forms, such as rolling dunes, fields of "snow flowers" formed of drifting snow, cliffs of towering ice masses, and along the shore the giant glaciers. A glacier 60 miles long was measured once, along that frigid coast. There are volcanoes, one at least known to be actively smoking. As for the whiteness that such a country suggests, that whiteness is often wonderfully colored by sunsets, shadows, and the magnificent aurora phenomena. The cold is intense, even the summer months of December and January being colder than freezing. As for winds, Antarctica

is the home of the most terrific gales on earth.

These forbidding but fascinating shores have been approached from different angles by explorers, who planted flags for their countries at different points and named the surrounding territory after kings and other notables. These known sectors are joined with dotted lines by the map-makers in order to suggest the probable outline of the vast South Polar country.

Graham Land an Archipelago

Just four years ago, Sir Hubert Wilkins flew over a corner of the Antarctic and discovered that the region of Graham Land is not joined to the continent at all. It is a separate group of islands. And that may be only the first of a series of surprises. Some geographers think that the South Polar "continent" may turn out to be no continent at all. It may be several large islands welded together in ice.

This is one of the geographical mysteries that the Ellsworth flight may solve. Making the longest non-stop polar flight ever attempted, Ellsworth and Balchen will cross and return over Antarctica at its narrowest point—

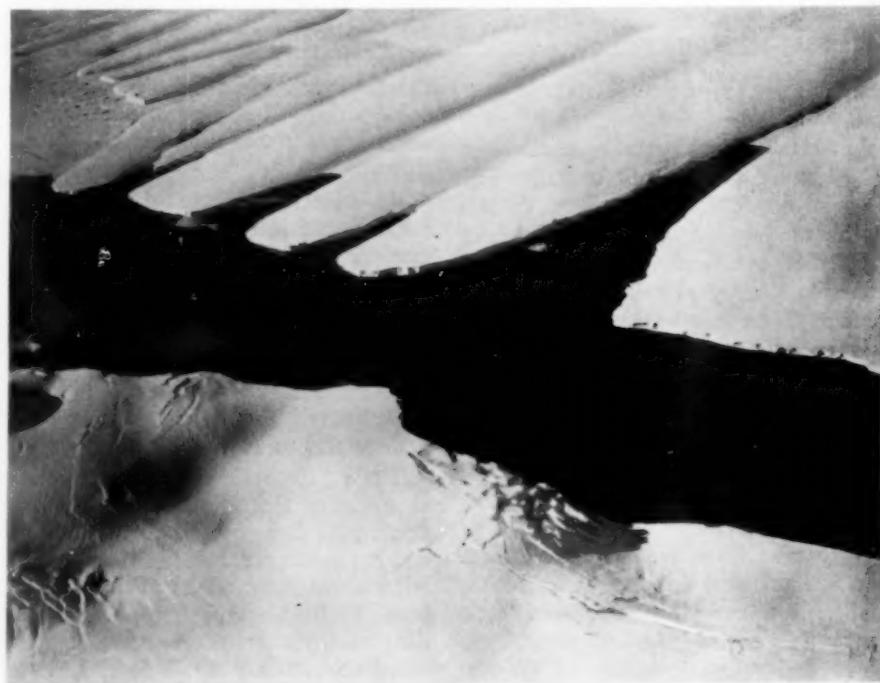


Photo by Byrd Expedition

BEAUTY AND MAJESTY OF ANTARCTIC ICE TONGUES

where the Ross Sea and the Weddell Sea cut deeply into the circular land.

This is the line along which geographers think Antarctica may be divided in two. A smaller portion may be separated from the larger by a strait obscured by ice. Admiral Byrd and Sir Hubert Wilkins recently showed that the seas run farther inland than had been expected.

So little is this part of Antarctica known that Ellsworth has estimated only 300 miles of his 1,450 mile crossing have been seen by the eye of man. The middle third of the journey will be the most full of unknown quantities. Flying from the Ross Sea to the Weddell Sea, he expects to turn his plane and fly back without stopping, making a 2,900 mile journey in 20 hours.

All the way along the lonely route, a clock-like camera will map the terrain, snapping a picture every ten seconds. Given such a record, geographers at home in comfortable laboratories may be able to decide what the land mass of the Antarctic shall be called—continent or islands.

Admiral Byrd's next expedition, awaiting favorable conditions, will also continue to gather data showing what the land is like that lies under so much ice. With a base camp only 300 miles from the Pole, Admiral Byrd is planning to explore Marie Byrd Land, which he discovered and named after his wife.

There are lofty mountains in Marie Byrd Land, with rocky tips sticking up through the ice. Such peaks are the geographer's prime clues to the hidden land. By struggling with winds and cold, a geologist can manage to gather a few treasured rock samples from these exposed points. Then by comparing the kinds of rock collected in other parts of the continent, he can gain an idea of how the mountains are, whether aligned in chains or otherwise.

So rare are the bits of rock that a geologist can find in Antarctica, that stomachs of penguins even have been searched for valuable additions to the rock collection.

For some years both geographers and geologists have been trying to determine whether these mountain ranges of Antarctica are an extension of ranges on South America, Africa, and Australia. Not enough data have been gathered yet to answer that.

If the mountains do prove to be sections of the long chains, now broken down in part and covered by the in-

Conquest of The Last Continent

COOK—first to sail across the Antarctic Circle, 1773.

BELLINGSHAUSEN—first to circumnavigate the South Pole, 1775.

WILKES—reported the Antarctic land to be a continent, 1840.

ROSS—Explored the continent extensively, 1840-1842.

SHACKLETON—first to attain the South Polar Plateau, 1908.

DAVID—located the South Magnetic Pole, 1909.

AMUNDSEN—first to reach the South Pole, 1911.

SCOTT—arrived at the Pole a month later, 1912.

WILKINS—first flew a plane in the Antarctic, discovering Graham Land to be an archipelago, not part of the continent, 1928.

BYRD—first to fly over the South Pole, 1929.

MAWSON—traced the longest continuous land border in the Antarctic—west of the Ross Sea—1911-1931.

ELLSWORTH—plans flight across the continent, 1933.

BYRD—planning to establish base camp within 300 miles of the Pole, 1933.

tervening ocean, it will indicate that long ago in earth history the South Polar land was joined to one or more of the other continents. And if such land bridges did exist, leading down to the South Pole, doubtless in those remote days animals and birds from South America and Africa migrated across the polar region.

Biologists rather think this must have happened, for otherwise they can only wonder how the ancestors of the Australian kangaroos, wombats, and other paunch-carrying animals managed to get there from South America, where the marsupials presumably originated.

But at present so little is known about the far-off times in Antarctica that Dr. Isaiah Bowman, director of the American Geographical Society of New York, once said: "Finding a fossil marsupial in Antarctica would excite science as much as a message from Mars."

That the South Polar region was once warm enough to encourage life is certain, because coal beds outcrop in

the mountain peaks. That means that 150 million years ago, the weather must have been mild enough for trees and plants to live and die and decay and be packed down to form coal. Today there are only two flowering plants in the Antarctic, and they are scrawny, stunted things. The largest form of land life there today is a spider, except on the rocky island fringes where penguins and seals congregate.

Barrenness of the Antarctic is almost incredible. The ice sheet is no thin frozen veneer but a cap thousands of feet thick, the remnant from an ancient glacial age.

There again science calls upon explorers to find out—

How thick is the ice sheet, and is it really shrinking?

The present scientific view is that the cap is shrinking, but so slowly that no perceptible change takes place. Why it is shrinking is one of the weather mysteries of the Antarctic.

The thickness of (*Turn to Page 186*)

PHYSIOLOGY

Sterol Ring Seen as Possible Growth Key

DOES ALL growth, cancerous as well as normal, hang on the ring-shaped group of atoms known to chemists as the sterol ring? At the meeting of the British Association for the Advancement of Science at Leicester, Sir Frederick Gowland Hopkins, president of the Royal Society, called attention to a remarkable chemical kinship that exists between three widely differing substances that produce widely differing growth effects in the body. Vitamin D has been shown to consist of a substance belonging to the chemical group known as the sterols. There are sterol "rings" also in the parts of tar that cause cancer.

Finally, oestrin, one of the female sex hormones or gland secretions, contains the same chemical structures. They are, however, differently arranged in the three compounds, and differ also in the amount and manner of attachment of hydrogen atoms.

Sir Frederick cautioned against hasty and sweeping conclusions based on this observation, but said, "It is difficult when faced with such relations not to wonder whether the metabolism of sterols, which when normal can produce a substance stimulating physiological growth, may in very special circumstances be so perverted as to produce within living cells a substance stimulating pathological growth."

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TECHNOLOGY

New Tool Eliminates Guess-Work in Cutting

MACHINE shop foremen and mechanics will welcome the invention of Prof. O. W. Boston and C. E. Krauss of the University of Michigan of a tool which measures the cutting properties of metals. With this device intelligent modifications of tool angle, depth of cut, feed, and type of cutting fluid used can be made to suit the particular job at hand.

The special tool-holder, for use in lathe, planer, or shaper, is fitted with a dial which indicates the vertical force on the tip of the cutting tool. By checking the readings of the dial against known loads, the force on the tool in pounds can be determined. If the tool is employed in different ways on the same

metal the proper technique for the cutting of that particular material will be apparent. On the other hand the machinist may judge accurately the machinability of different lots of material.

The inventors found that with the new device they could determine rapidly and with little expense the relative efficiencies of various cutting fluids. For example on soft rolled steel lard oil was found to be superior to heavy mineral oil under certain working conditions. Other mixtures such as mineral-lard oil and various emulsions were assigned their respective places in order of desirability. For harder steels, however, the order was not necessarily the same. The shape of the tool was also shown to have a pronounced effect.

The simplicity of the device is in marked contrast with the elaborate methods usually employed in tracking down the somewhat vague and illusive property of machinability.

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BOTANY

Apples of Sodom Still Bear Ancient Curse

THE LEGENDED Dead Sea fruit, fair without and ashy within, has a certain factual foundation, relates Dr. Ephraim Ha-Reuben of the Hebrew University in Jerusalem, long a student of the folk-botany of Palestine.

In the traditional region where once the wicked cities of Sodom and Gomorrah once stood, travellers can hardly avoid seeing a species of shrub with large broad leaves, violet flowers, and fruits that look rather like fine apples. But disappointment awaits him who thinks to slake his thirst on these apples, for they are filled inside, if not with ashes, at least with fluffy dry fibers of as little worth for the appeasement of a dry throat.

There is a second shrub, so thorny that it is much used in hedges, that bears bright yellow fruits resembling lemons in appearance, though the plant is botanically related to tomatoes and potatoes. These fruits also are of no value to the thirty wayfarers, for they are intensely bitter.

The Arabs say that when the wicked cities of the plain were cursed to their destruction, their fruits were cursed also. They call them, respectively, "apples of indignation" and "lemons of indignation."

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PSYCHOLOGY

Electrical Instrument Used as Dream Detector

HOW CAN you tell when a sleeping person is having a dream?

A sensitive galvanometer has been used in a psychological experiment to reveal when a dream occurs. The experiment was described to the American Psychological Association by Dr. Louis W. Max, of New York University.

The sleepers were deaf-mute persons. The hands of the deaf are used for both their "speech" and their written thoughts. Perhaps for this reason, thinking in the deaf was found to be accompanied by action-currents in the muscles of the hands. Action-currents are those minute electrical currents that accompany nervous impulses.

A galvanometer and vacuum-tube amplifier provided a means for recording for scientific study these minute currents in the hands.

The emotions of worry and fear also produce the action-currents, as do many types of sense stimulation.

Further research is now in progress which may reveal whether these action-currents in the hands of the deaf are an essential part of their thinking process or whether they are a by-product.

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PSYCHOLOGY

Knowledge Of Grades Spurs Best Students

THE KNOWLEDGE of his grade may help a student to do better work, and then again it may not, it appears from a report of Dr. Paul J. Fay of DePauw University to the American Psychological Association.

Students who received the highest grade of "A" were spurred to better work when informed of the grade, Dr. Fay found in an experiment. "B" students achieved considerably less. Students of lower intelligence did much better when they were told of their grades than when they were not.

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IN SCIENCE

SCIENCE FIELDS

BIOCHEMISTRY

Analysis of Fingernails
Clue to Arthritis Cause

CYSTINE, a sulfur-containing organic compound, is deficient in the fingernails of persons suffering from arthritis, often known as "rheumatism of the joints," Dr. M. X. Sullivan and Dr. W. C. Hess of Georgetown University told the American Chemical Society at its Chicago meeting.

The two research men tried injecting colloidal sulfur into the blood stream of six arthritis patients. They found that the cystine in their subjects' fingernails returned to normal, and at the same time the symptoms of arthritis abated.

Drs. Sullivan and Hess are now working on the problem of the relation of certain microorganisms to arthritis. They state that the lowering of the cystine content of body tissues implies the presence of injurious substances resulting from the activity of such microbes.

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PUBLIC HEALTH

Many People Volunteer For
Sleeping Sickness Tests

HUMAN volunteers for the test of encephalitis, the sleeping sickness now prevalent in the region around St. Louis, will not be lacking if the investigation into its cause and mode of transmission reaches a phase where such heroic experimentation is justified. Dr. J. P. Leake, U. S. Public Health research worker in charge of the Government's forces in the St. Louis area, informed Science Service that many letters have already come in from persons willing to risk their lives and health in the battle against the malady by permitting themselves to be inoculated with its dangerous virus. However, he added, the investigation has not reached a point where such sacrifices would be of any practical benefit.

The "inclusion bodies" found by Dr. Margaret G. Smith of the Washington University School of Medicine are not

the cause of encephalitis, but are among its effects, Dr. Leake explained. They are small specialized particles that appear within the cells of persons or animals afflicted with diseases caused by filterable viruses, and are regarded as quite characteristic symptoms of such diseases. Discovery of these inclusion bodies in the tissues of persons dying of encephalitis in the present epidemic confirms the suspicion which medical scientists have held about the disease for a long time: that its cause is a filterable virus.

The actual area which the outbreak now occupies would be hard to define, Dr. Leake said. There is always a little encephalitis all over the country, and these scattering "normal" cases make the boundary of the outbreak itself difficult to trace. However, he stated, the incidence of encephalitis seems to be at least a little higher this year as far west as Wichita, Kansas.

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GEOPHYSICS

Wind May Affect
Geyser Activity

THAT THE ACTION of wind affects the intervals between eruptions of geysers of the open or pool type, is the opinion of Ranger-naturalist Herbert T. Lystrup of Yellowstone National Park, following a careful study and check-up of approximately fifty eruptions of the Daisy Geyser, in the Upper Geyser Basin or Old Faithful sections of the park.

During this period the average interval between the Daisy's eruptions was 111 minutes, while the longest and shortest intervals were 153 and 90 minutes, respectively. Observation showed that the time of longest interval was characterized by strong winds blowing over the geyser from the north or the south.

Mr. Lystrup suggests that the factors that might bring about the delay in eruption by strong winds sweeping over the open geyser are quite obvious. The wind quickly carries away the vapor and steam and greater evaporation takes place. Greater evaporation affects distinctly the cooling of the water.

The Daisy is a powerful little geyser that plays frequently and comparatively regularly. During the past few years it has been increasing in frequency and power.

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ZOOLOGY

Herds of Wild Asses Still
Roam Mongolian Plains

See Front Cover

WILD asses, that still roam the vast plains of Mongolia in great herds, are marvels of speed and endurance, according to Roy Chapman Andrews of the American Museum of Natural History, who has hunted and photographed them in the course of his many years of scientific exploration in interior Asia. One full-grown animal he pursued in a motor car reached a top speed of forty miles an hour, and would not own itself beaten in the chase until it had been pursued for more than twenty miles, most of the distance at an average speed of thirty miles an hour.

The little colt shown on the cover of this issue of the SCIENCE NEWS LETTER was lassoed from the car after a short chase during which he put on a burst of speed at twenty miles an hour, although he was then only about three days old. Taken into camp, he proved to be intractably wild, and made friends only with "Buckshot," the Chinese assistant who fed him evaporated milk from a bottle. His Chinese friend he would follow like a dog, even into the cook-tent, but he never let any other person lay a hand on him. After six weeks, Mr. Andrews states, he was even wilder than he was when newly captured.

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PSYCHOLOGY

New Test Determines
"Motor Age" of Children

A NEW TEST to measure children's "motor age" was described at the meeting of the American Psychological Association in Chicago this week by Dr. Madga Skalet Skeel, of Western Reserve University.

It will delight the children. In this test they do not need to answer questions. They jump, balance, and step over hurdles. This is to test the large muscle coordination. As a test of small muscle coordination, the youngsters are allowed to cut, sew, and wind. Over 300 children have already taken the test to determine what scores can be expected at different ages. The test is intended for youngsters from 2 to 5 years old.

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From Page 183

the sheet is enormous, if the German geologist Prof. W. Meinardus is right in his estimates. It is definitely known that the South Pole is 10,000 feet above sea level, which is almost as lofty an elevation as some of the Alpine peaks. The known portion of Antarctica has a high average elevation.

But—Prof. Meinardus believes that most of this loftiness is just ice. The hidden land, he estimates to be not more than 2,000 feet above sea level. In reaching this conclusion, he was guided mainly by the height of neighboring continents. If he is right, the ice sheet over Antarctica is so enormous a store of cold that it is hard to find ways of appreciating it. He says that if spread thin over the earth, it would bury every country under more than 120 feet of ice. If it should melt, it would raise the oceans 100 feet.

This ice, piled on top of Antarctica, is reason enough why that continent had to wait for the age of science before its secrets could begin to be probed.

World's Weather Factory

Remote and fantastic as the Antarctic seems, it is important to the rest of the world. If nothing else comes from the ice cap, plenty of weather is manufactured there, and nobody knows yet how directly it affects the weather of the United States and Europe. The ice patrol has reported that water from the Antarctic apparently creeps as far north as Greenland, a 10,000 mile sea journey. Between Greenland and Labrador the patrol found that the deep water was so cold and salty as to suggest an origin in the distant Antarctic.

It is generally agreed that the world should be having weather reports and forecasts from its Antarctic weather factory. The influences of that weather factory on northern countries may still be doubtful, but there is no doubt that southern continents get a large share of their "weather" from the frozen south. Australian wheat farmers and South American cattle men could be better prepared for droughts and other weather troubles if warnings were dispatched from far southern stations.

Dr. Bowman in a discussion of this problem said, "It would pay handsomely in crops and cattle and security of life if meteorological stations were set up on the borders of the Antarctic and on the island groups that girdle it."

And Dr. Bowman added: "It is under the impulse of this idea that Captain Sir Hubert Wilkins has carried on his explorations in the Antarctic Archipelago for two seasons. He did not go down there just for fun; he was searching for suitable bases for meteorological stations to be established by international cooperation. With a ring of such stations about the Antarctic and with daily weather reports from them by radio, it would be possible to draw charts that would trace the effects of cyclones and anticyclones as they move forward from breeding places out over the southern ocean."

Physicists are among the scientists who have important errands for exploring expeditions to do in the Antarctic. For one thing, they would like to have records taken of the cosmic rays in the world's highest latitudes. As far as such researches have gone, they have shown that the rays from outer space gain in intensity as the higher latitudes are reached. Perhaps the polar regions may yield facts that will help in learning whether or not the cosmic rays are electrons, as some physicists think.

The beautiful southern auroral displays, which are like brilliant curtains and arcs, may be linked with the cosmic rays. A French physicist, Dauvillier, has evolved the theory that the rays are electrons shot from the sun through the action of strong electric fields on the sun. Those cosmic rays that approach the earth, he reasons, would be affected by the earth's magnetic field, and near the magnetic poles would produce the aurora. That, too, is something for expeditions to test and prove.

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PSYCHOLOGY

Waltz Time Preferred To Foxtrot Rhythm

DESPITE the great popularity of the foxtrot, its rhythm takes second place when compared with the rhythm of the waltz, it was revealed by tests reported by F. H. Lewis of Bates College.

The tests eliminated the possibility that the subjects would be influenced by melody or other factors by having the rhythm produced by timed and amplified oscillator tones. Not only was the three-four time preferred, but the waltz rhythm was also better able to produce movement, it was found.

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PSYCHOLOGY

Chimpanzee's Vision Is As Acute As Man's

HOW CHIMPANZESES were given tests of vision and found to have about the same keenness of eyesight as man was related to members of the American Psychological Association in Chicago by Kenneth W. Spence, of Yale University.

A new test of vision was devised to compare the vision of the apes with that of a five-year-old child and also human adults. For, of course, the chimpanzee cannot be expected to read the queer looking E's, A's, and so on, that appear on the chart usually used for testing vision. Neither, for that matter, could the human child.

The test for them consisted of choosing a box having a circle with black and white stripes on it, in preference to one having a plain clear circle. The width of the stripes could be varied by the examiner very gradually until they were so narrow as to be invisible to the eyes of the subject. The keener the eyes, the narrower the stripes could be made before the subject would be confused and be unable to choose the right box. The box with the striped circle contained food.

The human adults were tested with the same circles, but were allowed to say which had the stripes.

The eyesight of one of the chimpanzees was about the same as that of the human adults and definitely better than that of the five-year-old. The other chimpanzee had the poorest vision but was probably upset by his physiological condition at the time.

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HOW ANIMALS SPEND THE WINTER

an address by

Austin H. Clark

of the U. S. National Museum

To be given Friday, Sept. 22, at 1:45 p. m. Eastern Standard Time over stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

CHEMISTRY

American Rubber Given Service Tests in Auto Tires

Test Tires of Guayule Last About 10,000 Miles; Synthetic Rubber Claimed Superior For Special Purposes

RUBBER from the only source within the borders of the United States, the guayule shrub, has been given a commercial test in automobile tires and tubes. What the motorist and the army could expect from tires that would have to be made from this local source in case of a war embargo was told to the American Chemical Society by J. Harvey Doering of the Firestone Tire and Rubber Company.

The test tires built by this company from rubber that was exclusively guayule failed between 8,500 and 10,200 miles because of tread wear. The inner tubes proved satisfactory throughout the test.

The chief difficulty with the extensive use of guayule rubber is its high resin content, Mr. Doering said. This can be overcome by an expensive process that will remove the resin. The tires tested were not made from treated rubber, but contained from 18 to 20 per cent. of resins. These rubbers are extremely soft and sticky so that it was found necessary to add several "drying" pigments before the tires could be built.

Good for Emergency Uses

Small quantities of dirt and bark in the rubber made it very difficult to build good tubes. Mr. Doering expressed the opinion that these foreign substances could be removed by some straining method such as is used in cleaning reclaimed rubber.

It seems very improbable that the guayule product will take the place of Hevea rubber imported from the East Indies except as an emergency measure, such as war. Uncle Sam probably has enough stored away, in the form of new and reclaimed rubber, to last the nation for perhaps two years in case of war while rubber experts are developing this emergency supply. Under these conditions Mr. Doering promised guayule tires as good as the fabric tires of 1918.

Synthetic rubber made from chemicals is claimed to be superior to natural rubber for special purposes. Tests that

showed its advantageous properties were described by E. R. Bridgewater of E. I. du Pont De Nemours and Company before the Chemical Society.

Although the synthetic rubber known as DuPrene is quite similar to natural rubber in its mechanical properties, it has entirely different chemical properties. This industrial rubber will resist swelling and dissolving in oils and greases. For example, ordinary soft rubber will dissolve completely when kept in hot crude oil for a week, whereas the synthetic rubber swells but does not lose its rubber-like properties.

SOCIOLOGY

Minnesota Research Discloses Tragic Facts on Unemployed

THAT THE LOT of the unemployed in the present depression is hard and that irreparable harm is being done is not questioned. Solid, unequivocal statistics on the human effects of the depression are, however, difficult to obtain.

At Minnesota, pioneering experiment in practical sociology and psychology, the Employment Stabilization Research Institute, one of its industrial social workers, Jessie A. Bloodworth, has investigated the fate of 500 individuals who a year earlier had passed through the model employment offices operated by that organization in cooperation with the state.

The results are illuminating. Only 39.4 per cent. of the 500 individuals studied had found employment that lasted as long as one month since becoming unemployed. Only 42 of the group who found employment were working when the study was made. The others worked only a few months and were again laid off. Most of the jobs secured were on a lower occupational level than the usual occupations

The deterioration of rubber on exposure to air and sunlight is less marked with DuPrene. It is vulcanized by heat alone without the addition of sulfur that sometimes proves objectionable in vulcanized natural rubber products.

Automobile tires have not been made from the synthetic rubber mainly because of its expense. It is used for special purposes such as fabric belts, gasoline hoses, insulated wires, bottle stoppers, etc., that are exposed to oil, and conveyor belts that handle hot abrasive materials.

Dr. Wallace H. Carothers, research chemist of the DuPont Company, concluded that the problem of synthetic rubbers is not solved completely as yet. The chemical mechanism underlying the synthetic manufacturing process is not clear, nor are the reasons for the physical properties of all rubbers. He expressed the opinion that a further study of the giant chemical molecules in rubber would make possible synthetic rubbers of still better properties particularly in connection with specialized uses.

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followed by the individuals. Forty-five per cent. of 500 had been unemployed two years or more before the first of this year. Relatively few of these had found reemployment.

The social worker reports:

"A larger proportion of those under 45 years of age than those of 45 and over were successful in finding employment. A larger number of the later depression than of the early depression unemployed found jobs."

The NRA will be interested in the fact that a quarter of all those who secured some work received less than \$15 a week, and 11.3 per cent. of those who found work worked 70 or more hours a week. Yet only two individuals left their jobs because of dissatisfaction with working conditions.

Important and disheartening is the fact that a definite breakdown in morale was observed in the majority of the persons who have been reduced to destitution through prolonged unemployment.

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PSYCHOLOGY

Turn on the Light Brightly; Then You Can Hear Better

Tests Prove Eyes Are Real Help to Ears; Sensitivity of Fingertips to High Pitched Vibrations Found High

DO YOU sometimes feel that you cannot distinguish sounds very well when you are out on a very dark night?

You may be right. Your eyes are a real help to your ears in distinguishing the pitch of two notes or the intensity of different sounds, it appears from tests reported to the American Psychological Association meeting in Chicago by Dr. George W. Hartmann of Pennsylvania State College.

The tests were given at night in a room which was alternately dark and then flooded with brilliant illumination from a total of 510 watts in electric lights. In another series, each test in the dark was followed by one with a lighted 100-watt bulb dangling directly before the listener's eyes.

The listeners were consistently better able to distinguish both pitches and intensities when in the light.

Hearing Through Fingers

The fingertips are sensitive to vibrations much higher than what has been considered the upper limit for them, Dr. Robert H. Gault, of Northwestern University, told scientists gathered for the meeting.

This sensitivity of the fingertips to the higher ranges of vibrations is important because of the possibility that the deaf may be able to supplement their lip reading with "finger hearing."

Previously the upper limit has been set at 2,700 double vibrations per second or less. In Dr. Gault's laboratory, subjects were able to detect rates as high as 8,192 per second. This, he believes, is due to the instrument used for transmitting the vibrations.

The ear is 100 times as sensitive as touch at 64 double vibrations per second, but at 4,096 per second the ear is 500,000 times as sensitive. Correct amplification might correct for these variations in sensitivity, Dr. Gault said.

If you have difficulty in hearing a conversation conducted in a noisy place, or if you cannot understand a speaker who seems to be talking loudly enough, your

difficulty is quite likely not with your ears at all.

Some persons have outstanding lack of ability to perceive speech, Dr. Thomas H. Howells, of the University of Colorado, told members of the American Psychological Association.

A novel test prepared by Dr. Howells revealed this defect. It was prepared by dictating common words and recording them, along with different conflicting sounds, in a sort of jumble of sound on phonograph records. The records were then played quite loudly.

Strangely enough, it was found that there is practically no relation between scores on speech perception under these circumstances and scores on tests of hearing ability.

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MEDICINE

Medicine Advanced By Crystal Pure Secretions

PURIFYING gland secretions until they will form crystals, an accomplishment of modern chemistry, is one of the greatest aids that the medical art has received in recent years. It enables the physician to gauge his dose exactly instead of estimating it, it makes possible the introduction of drugs directly into the blood stream for practically instantaneous effect, and in many cases it eventually leads to the synthetic production of the same or even better principles at lower cost.

Progress in medicine made possible by the identification and purification of the hormones or ductless gland secretions was outlined in an address in Chicago by Prof. Julius Stieglitz of the department of chemistry, the University of Chicago.

Prof. Stieglitz related one dramatic incident that came under his own observation: "A mother lay ready for childbirth in the Chicago Lying-In Hospital but with a heart too weak for the strain. Her heart had actually stopped beating and the eminent obstetrician

faced the necessity of sacrificing the mother to save the child by a Caesarian section, but he allowed one minute more for an injection of epinephrine. The heart responded, the mother revived, and with the support of epinephrine passed through her ordeal. Today both mother and child are alive and well."

Epinephrine, used in this case, was the first of the hormones to be isolated in crystalline form; this was the work of Prof. John J. Abel, veteran scientist of the Johns Hopkins University. One of the latest hormone isolations is the work of a very young chemist, Prof. Edward A. Doisy of St. Louis University. The gland extract which he has succeeded in purifying to crystalline form is theelin, the female sex hormone. It has been used by physicians not only for the correction of deranged sex-physiological conditions, but for the successful treatment of mental disorders and other secondary disturbances.

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INVENTION

New Device May Enable Blind to Read Printing

AN INVENTION which promises to allow the blind to read and which may thus become a boon to those without sight has been made by Georg Schutkowski, a Berlin engineer. It is based on what the inventor calls "optical congruity" and applies photoelectric cells, now used for the detection of differing intensities of light, to the detection of differing forms and figures.

From a letter, or figure, two corresponding pictures are produced by photography. Projected on top of each other, the two pictures are completely covering.

In the device of Schutkowski a negative film of a common printed alphabet is put into a revolving drum, which has windows at regular intervals. An optical lens combination projects the original black print alphabet onto the windows of the drum, in which the negative picture is located in reverse position. When the projected black print letter falls on the proper negative of the drum, complete darkness is produced behind the film for the fraction of a second. A photoelectric cell, which is placed behind the drum, consequently is in darkness for this time. Attached to the photoelectric cell is an arresting magnet, which for the fraction of the second stops the motion of the drum and connects the current of an electric phono-

graph to a loud-speaker. The phonograph record has at the given place the corresponding letter in speech. So the printed letter is reproduced as sound. The blind man thus hears the letter which is printed in the original print.

It is also possible to let him feel it instead of hearing. To this purpose the current moves the letters of a Braille alphabet which are fixed on levers.

The same principle could be of course also applied to translating letters into secret codes, or letters into figures, or letters of a language into the sound of another one. But the chief application projected is for the use of the blind to allow them to hear or feel ordinary print.

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ECOLOGY—ANTHROPOLOGY

Shifting Corn Belt May Have Influenced Culture Migrations

THE GREAT American corn belt, that rich agricultural empire that now centers in eastern Iowa and western Illinois with its borders extending from Indiana to central Nebraska, seems to have been more or less of a migrant during past ages, swinging from west to east and back again in sensitive response to change in climate. Evidence that its center was once as far east as Ohio has been found in the records of prehistoric Indian cultures by Prof. Paul B. Sears of the University of Oklahoma.

Much evidence for changing climates in North America during the past ten thousand years or so has been produced by the study of pollen grains and other plant remains buried in peat bogs, and a good correlation between these changes and similar ones in Europe has been worked out. In these researches Prof. Sears has made himself a leader.

The succession of post-glacial climates has been cold-moist, cool-dry, moist, warm-dry, moist again. With each succeeding type of climate a characteristic type of vegetation has developed in any given part of the eastern United States. In the Ohio region it worked from forests of evergreens in early post-glacial times up to a rich mixed forest of hardwoods some five thousand years ago. Then came the period of warmth and comparative dryness. The forest became more open, invaded by open grasslands. This set up conditions most favorable for the cultivation

of corn and for the invasion of bison herds. This phase ended in the return of a moister climate and the re-growth of the heavy forest which white men found when the first explorers entered the Ohio valley.

The archaeological records examined by Prof. Sears indicate that with each type of natural vegetation there was probably associated a special type of Indian culture. At the crucial time when the Iowa-like prairies invaded Ohio and made corn-growing and bison-hunting possible, there was in possession of the land a predominantly hunting people, of the Algonkian Indian culture group. As their native forests retreated eastward they went with them, and their place was taken by a corn-raising Indian people from the West, a people we know now only from their mound-building culture, one high type of which we call the Hopewell. They held the land and built their monuments; but when the climate switched to forest-favoring humidity again they had perforce to return whence they came, where cornfields and buffalo-hunting were still possible. As they left, the forest-dwelling Algonkian re-possessed themselves of the land.

Histories of similar culture-migrations following the migrations of natural vegetation as influenced by climatic fluctuations have been traced by Prof. Sears for other parts of the country; he terms the study "the archaeology of environment."

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PLANT PHYSIOLOGY

Plants May Produce Some Oxygen For Own Needs

OXYGEN needed by the roots of plants may be to some extent supplied by the plants themselves, from the oxygen generated as a by-product in the manufacture of food in the leaves. Evidence on this point has been obtained in experiments by Prof. W. A. Cannon of Stanford University, who has made preliminary reports to the Carnegie Institution of Washington and to *Plant Physiology*.

Prof. Cannon set jars containing shoots of willow and other plants in darkness and in light, and compared the rates at which their roots used up oxygen. He found in the larger number of cases that the illuminated shoots needed less oxygen from the outside, and therefore reached the tentative conclusion that the extra supply of the needed element was being provided for internally.

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TECHNOLOGY

Electric Process Makes More Efficient Sandpaper

SANDPAPERS that are claimed to be 50 per cent. more efficient than the best previously manufactured brands are now made by a 75,000 volt electrical process.

This intense electrostatic field sprays the cutting particles of garnet, aluminum oxide and silicon carbide on to the glued paper more evenly.

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ARCHAEOLOGY

Folsom Type Dart Points Distributed Over Wide Area

A THESIS by a young student anthropologist at the University of Denver opens up new thoughts on America's first inhabitants.

The student, Jack Cotter, has gathered together threads of evidence dealing with human beings who seem to have lived in America before the various known types of Indian culture began to develop. The evidence is in the form of curiously shaped stone blades used by primitive Americans in hunting. No such blades were shaped for use by Basket Makers, Plains tribes, Aztecs, Incas, or other Indians of the long period of prehistory that preceded the coming of the white man. Now and again, the soil of some old river bed or buffalo wallow has yielded one or more of these old stone blades. Folsom points and Yuma points, the archaeologists call them, after the places where they first attracted signal attention. Usually, the blades are found associated with the fossil bones of mammoths, ground sloths, or other animals that departed this land near the end of the Ice Age.

Mr. Cotter has made a study of these weapons that have been turning up from time to time. He finds that no less than 343 specimens are known to anthropologists. And the record of the ancient stone weapons shows that they were found in 30 states.

From New Hampshire to Oregon across the country, and from North Dakota to Louisiana, spread the groups of ancient hunters who tipped their spears with these stone blades. Nine types of blades have been differentiated by the young anthropologist, in his inspection and measurement of the Folsom and Yuma stone points. But all nine types are, to the eye of the expert in stone-craft, typical of that remote hunting age in America.

Probably few people have realized that the traces of "ancient Americans," men who inhabited this country 10,000 years or more ago, have been reported from such wide range of territory. If the story that the weapons appear to tell is the correct one, then the ancient hunters were scattered practically throughout the United States.

And that opens another door, into still more remote shadows of America's past. For if the wandering hunters and cave men of the Folsom age were so widely established, they cannot well have been new immigrants in the New World. The magnificent distances of America were surely never traversed quickly by pioneers in the Stone Ages of culture.

It begins to look as though the human history of America may stretch back into a rather longer period than is now generally assigned it. The hunters of the Folsom age seemed unbelievably old when their stone weapons first came to light. But perhaps there is a still older chapter of American habitation waiting to be discovered.

Science News Letter, September 16, 1933

CHEMISTRY

Medieval Greeks Knew Chemical Warfare Secrets

CONSTANTINOPLE might have become a Moslem city centuries before it did, had not the Greeks who held it during the middle ages known a secret of chemical warfare which enabled them to wipe out the Arabs' fleets and rout their land forces whenever they appeared. Only when the defenders of the city had become too soft for war and had forgotten the secret did the green banner of the Prophet rise above its walls.

At the meeting of the American Chemical Society in Chicago, Dr. Nicholas D. Cheronis, director of the Synthetic Laboratories of Chicago, told of his endeavors to find out the secret of the "marine fire" or "prepared fire" which twice wiped out besiegers' fleets and helped to defeat their armies on many occasions.

"Marine fire" was the invention of an architect named Kallinikos, who came to Constantinople from either Syria or Egypt a short time before its first siege by the Arabs in the year 670. Swift boats armed with "siphons" to discharge his secret compound swept down upon the Arab galleys, and burned them to the water's edge.

Again in 717 the Arabs came with

a fleet and an army, and again the Greeks, using Kallinikos' fire, routed them utterly. The inventors' descendants, entrusted with his secret and guarding it jealously, manufactured the fire for the Emperors of Constantinople for many years, and it never failed to bring destruction and terror to the enemy.

Kallinikos' fire was not the famous "Greek fire" of antiquity, Dr. Cheronis is convinced. The latter was used for many centuries. Its composition varied, but was basically a mixture of oils, resins, and similar combustibles with sulfur. The fire of Kallinikos was fiercer, to judge by the descriptions that have come down to us.

Some chemists have conjectured that it contained quicklime, which when it touched the water generated enough heat to set the compound afire. But Dr. Cheronis tried this, and also another chemical which had been suggested as the key to Kallinikos' secret, and found that combustion could not be started in that way.

A more probable hypothesis, in his opinion, is that Kallinikos had discovered the possibilities of saltpeter, one of the ingredients of the later-invented gunpowder, and used it with the oils and resins to make his terrible flames. The "siphons" of the ships, he thinks, may have been the nozzles of pumps for discharging the liquid, which was then ignited by throwing a flaming dart or shooting a flaming arrow.

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GEOPHYSICS

Frozen Gas Found 2800 Feet Below Earth's Surface

BORINGS for mineral water at a Polish health resort have resulted in a frozen carbon dioxide coming up from 2,800 feet below the surface.

It is claimed that this is the first time that solidified carbon dioxide has occurred without mechanical aid. This solidified gas, commonly used as a refrigerant by vendors of ice cream, freezes at minus 57 degrees Centigrade. The solidification is supposed to be due to the rapid expansion of the gas from the enormous pressures existing at this great depth.

A similar method of manufacturing "dry ice" can be accomplished by allowing compressed carbon dioxide in a cylinder to expand rapidly into a paper bag tied over its nozzle.

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DEMOGRAPHY—PLANT PATHOLOGY

**Moved by a Fungus**

THE DEADLY blight fungus, that has ruined our native chestnut forests, indirectly assisted in the creation of the new National Park in the Great Smoky Mountains of Tennessee and North Carolina.

One of the most valuable of the many kinds of trees found in that magnificent scenic region was the American chestnut. Its lumber, though not as strong as oak or as tough as hickory, still found a ready market (especially, for some reason, among coffin manufacturers!), and its huge crops of nuts were a food staple among the mountaineers, who also exported large quantities of them to the cities. The tree was economically interwoven with the people's life.

When the project was broached to make the Great Smoky Mountains, the last unspoiled wilderness area in the Southern Appalachians, into a great National Park for the East, the promoters of the idea foresaw more or less difficulty in inducing the mountain folk to leave their upland homes, where they and their forefathers before them had won a living—albeit usually a meager one—from the same land ever since Revolutionary days. Mountaineers are usually firmly rooted to the bit of soil they call their own.

But when the officials of the National Park Service came to talk it over with the mountaineers, they found them much more willing to make a trade for lowland farms outside the proposed park area than they thought they would be. And one of the reasons for the loosening of their roots proved to be the coming of the fungus disease that killed the chestnut trees. This deprived them of a long-accustomed article of

food, and also cut off two sources of money income: part of the work in the sawmills and the sale of the nuts. With this economic push from behind, the inducement of better school opportunities for their children nearer the lowland settlements provided a pull in front, and between the two the mountaineers yielded and sold out to "the guvment."

Whether the chestnut blight is sending our native chestnut trees to the oblivion that has claimed the passenger pigeon and the heath hen, or whether the chestnuts will stage a comeback like that of the bison and the prong-horn antelope, is still undetermined. The fungus kills the trees down to the roots, but leaves the roots alive. They then send out thick clumps of sprouts, some of which have grown into large bushes or even small trees, beginning to yield a few nuts again.

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PSYCHOLOGY

Average Vocabulary of College Students Found

THE NUMBER of words known to college students was the subject of research reported to the American Psychological Association by Dr. Robert H. Seashore of the University of Oregon.

They know a great many, it seems, in addition to such technical terms as "date" and "prom" and "flat tire."

The average vocabulary of sophomores and juniors is about 15,000 non-technical English "root" words plus 52,000 derivatives of roots and about 3,000 special terms. This does not count words in foreign languages and the technical terms of such studies as the sciences.

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First Glances at New Books

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Page 192

General Science

GREAT MEN OF SCIENCE—Philippe Lenard—*Macmillan*, 389 p., \$3. Through the medium of historical studies of great men of science Prof. Lenard, the German physicist and Nobel laureate, tells the history of scientific progress in a very acceptable manner. Says Prof. Lenard in his preface: "What most struck me in recent writings on this subject was a want of that understanding of the great men of science which, so it seemed to me, should come from a study of their life history and their behaviour. I found that these scientists—or at least not a few of them, and those the most successful—were much more above the common run of humanity than the most widely read biographies suggested. My joy was great to find that these personalities so well matched the greatness of their achievements, that they were fit to serve as examples to future generations both from the point of view of their work and from that of their lives." Translation is by Dr. H. Stafford Hatfield with a preface by Prof. E. N. da C. Andrade of the University of London.

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Physics

ANALYTIC AND VECTOR MECHANICS—Hiram W. Edwards—*McGraw-Hill*, 428 p., \$4. A text for students in advanced courses in physics.

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Chemistry

INDUSTRIAL CHEMISTRY—Emil R. Riegel—*Chemical Catalog Co.*, 784 p., \$6. Of the making of textbooks in general chemistry for schools there is no end; but the almost equally great need of a good text and general reference book in applied chemistry, for both the student and the works chemist, has not been so abundantly met. That Prof. Riegel's work has been successful is well attested by the fact that a revision is now called for, in less than five years since the appearance of the first edition.

Science News Letter, September 16, 1933

Nature Study—Agriculture

NATURE STUDY AND AGRICULTURE—Charles C. Schmidt—*Heath*, 508 p., \$1.80. A revised edition. Students who can absorb and retain all the astonishingly varied information and suggestions in this book should grow into most valuable citizens of our rural areas.

Science News Letter, September 16, 1933

Nursing

I GO NURSING—Corinne Johnson Kern—*Dutton*, 256 p., \$2.50. As fascinating as any fiction is this volume of true stories from a nurse's experience.

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•First Glances at New Books

General Science

THE LOGIC OF SCIENCE—William G. Ballantine—*Crowell*, 230 p., \$2. The jacket states: "The art of research has far outrun popular understanding of the science. This book supplies an urgent need for a clear exposition of the few simple but profound principles that lie at the basis of all scientific reasoning." It was previously copyrighted under the title: "The Basis of Belief."

Science News Letter, September 16, 1933

Geology—Geography

AIRWAYS OF AMERICA GUIDEBOOK NO. 1: THE UNITED AIR LINES—A. K. Lobeck—*Geographical Press, Columbia Univ.*, 207 p., \$2.50. Years ago, the U. S. Government published two guidebooks describing in detail the country along the transects made by two pioneer overland railways. Those two books are still best sellers among government publications. In the present volume, a well-known geologist has done something of the same kind for one of the great transcontinental airways, giving clear accounts of the topography and structural geology of the country from east to west, reinforced by excellent air photos, maps and diagrams. Briefer sections tell of agriculture and the natural vegetation as seen from the air, of the weather and its effects on aviation, and of the modern management of airways and aircraft. The ideal way to read this book will be to hold it in your lap as your plane speeds along, and look out of the window from time to time for additional illustrative material.

Science News Letter, September 16, 1933

Pediatry

FOOT HYGIENE AND POSTURE FOR ADULTS AND CHILDREN—M. J. Pullman—200 p., \$2.50. The book is published by the author, a doctor of chiropody. The advice given on the care of the feet seems in accord with medical opinion on the subject. It would seem wise to consult one's physician before investing in the author's device, the foot Pullmanizer.

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Engineering

A SIMPLE METHOD OF SURVEYING FROM AIR PHOTOGRAPHS—J. S. A. Salt—*H. M. Stationery Office, London*, 145 p., 4 folded charts, 4s; and PARALLAX TABLES—*H. M. Stationery Office*, 82 p., 1s 6d. These constitute No. 8

and Supplement, respectively, of Professional Papers of the Air Survey Committee of Great Britain. Of professional interest.

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Economics—Government

A PRIMER OF "NEW DEAL" ECONOMICS—J. George Frederick—*Business Bourse, N. Y.*, 322 p., 2 folded charts, \$2. At once exposition and apologia, this book undertakes to tell, in very simple language built around diagrammatic ideas, the story of the revolutionary experiment on which the United States has embarked. It comes at a most timely moment, when the set-up of delegated powers which the Congress last spring gave to the President in unprecedented plenitude, is getting under way and for the first time meeting the test of application in practice.

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Botany

TREES OF NORTH AMERICA (EXCLUSIVE OF MEXICO): VOL. I—THE CONIFERS—George Rex Green—*Edwards Bros., Ann Arbor, Mich.*, 186 p., \$2. Full descriptions, with distribution, occurrence and uses of all species of nearctic coniferous trees. The book is lithographed from typewritten copy.

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Botany

TRICHOMANES—E. B. Copeland—*Philippine Jr. Sci.*, 280 p., 61 pl., 50c. A monograph thoroughly revising this fern genus as found in the Pacific area. An entire issue of the *Philippine Journal of Science* has been devoted to this publication.

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Physics

TEXTBOOK OF COLLEGE PHYSICS—C. A. Chant and E. F. Burton—*Holt*, 541 p., \$3.25. A well-planned text for beginning students in physics.

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Chemistry

A COURSE IN GENERAL CHEMISTRY—William McPherson and William E. Henderson—*Ginn*, 751 p., \$3.40. Fourth edition of a successful textbook.

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Psychology—Sociology

SOCIAL CONSEQUENCES OF PROLONGED UNEMPLOYMENT—Jessie A. Bloodworth—*Univ. of Minn. Press*, 16 p. 50c. A bulletin of the Employment Stabilization Research Institute written by an industrial social worker. Five hundred cases are reviewed one year after they had passed through the employment exchanges.

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Archaeology

THE HORSE AND THE SWORD—Harold Peake and Herbert John Fleure—*Yale Univ. Press*, 152 p., \$2. The eighth in the ten-volume series, "The Corridors of Time." This volume brings the story of civilization into the momentous period that included the siege of Troy. In the 400 years typified by "horse and sword" we "witness the death-throes of the Bronze Age civilization and the birth of those forces that were to mould the life of the Classical Age." The series is intended not so much a popular narrative as an account which may help the student-type of reader to obtain a general view of the sequence of events in ancient times.

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Philosophy

SCIENTIFIC THEORY AND RELIGION—Ernest William Barnes—*Macmillan*, 685 p., \$4. See article on p. 157, *SNL*, Sept. 2, '33.

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Invention

THE INVENTOR AND HIS WORLD—H. Stafford Hatfield—*Dutton*, 269 p. \$2.40. This book should help the inventor to understand himself and be understood by others; it also gives useful suggestions on such subjects as the direction of inventive effort, the financing of inventions, and patent law.

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Electricity

ALTERNATING CURRENT CIRCUITS—M. P. Weinbach—*Macmillan*, xvi+417 p., \$4.50. Designed as a text for students, this book will also be useful to the practicing engineer as a compact electrical *vade-mecum*.

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